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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,655	10/24/2003	Hiroshi Kawaura	Ishii Case 20	9922
23474	7590	07/05/2005	EXAMINER	
FLYNN THIEL BOUTELL & TANIS, P.C. 2026 RAMBLING ROAD KALAMAZOO, MI 49008-1631			MARKHAM, WESLEY D	
			ART UNIT	PAPER NUMBER
			1762	
DATE MAILED: 07/05/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/692,655

Applicant(s)

KAWAURA, HIROSHI

Examiner

Wesley D. Markham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-5 and 7-10 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-5, 7 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2003 and 18 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 4/18/2005 (with a certificate of mailing dated 4/15/2005), in which a substitute specification was submitted, the abstract of the disclosure was amended, two (2) replacement sheets of drawings were submitted, Claims 3 – 5 were amended, Claims 1, 2, and 6 were canceled, and Claims 7 – 10 were added. Claims 3 – 5 and 7 – 10 are currently pending in U.S. Application Serial No. 10/692,655, and an Office action on the merits follows.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 3 – 5, 7, and 8, drawn to a method of forming a CVD film on a substrate in which the gas introduction and chamber exhaustion steps do not occur simultaneously, classified in class 427, subclass 571.
 - II. Claims 9 and 10, drawn to a method of forming a CVD film using a specific series of process steps, classified in class 427, subclass 255.26.
3. The inventions are distinct, each from the other, because of the following reasons:

Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has separate utility, such as in the deposition of a film by a CVD process that does not include the

specific process steps required by the method of invention II. Additionally, invention II has separate utility, such as in the deposition of a film by a CVD process that does not use the helicon wave CVD apparatus required by invention I (e.g., an ECR-CVD process, a microwave plasma CVD process, an RF plasma CVD process, etc.), and/or a CVD process in which the process gas introduction and chamber evacuation steps occur simultaneously. See MPEP § 806.05(d).

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and divergent search requirements, restriction for examination purposes as indicated is proper.
5. As such, newly submitted Claims 9 and 10 (Group II) are directed to an invention that is independent or distinct from the invention originally claimed (Group I) (see the discussion above). Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, Claims 9 and 10 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Drawings

6. The two (2) sheets of replacement drawings filed on 4/18/2005 labeling Figures 3 and 6 as "Prior Art" are acknowledged and approved by the examiner.

Specification

7. The amended abstract of the disclosure and the substitute specification (clean copy, marked-up copy, and statement that no new matter is included) filed on 4/18/2005 are acknowledged and approved by the examiner.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
10. New independent **Claim 8** requires the steps of “providing a chemical vapor deposition apparatus comprising a belljar process chamber,... nozzles for supplying a process gas...” and “conducting chemical vapor deposition of the film on the substrate under conditions wherein either introduction of a process gas in a process chamber...” It is unclear whether “a process gas” and “a process chamber”, as recited in the second step of Claim 8, (1) refer to the process gas and the process chamber previously recited in the first step of Claim 8, or (2) are open to any process gas and any process chamber. As such, the scope of Claim 8 is unclear, and the claim is indefinite under 35 U.S.C. 112, second paragraph.

11. Amended **Claim 5** requires, "wherein after the introduction of the process gas, the steps are repeated to obtain a uniform predetermined thickness film". However, Claim 7 (from which Claim 5 depends) does not set forth any "steps" that occur after introduction of the process gas. Therefore, it is unclear what "steps" are repeated in Claim 5 (i.e., "the steps" lacks proper antecedent basis in the claims), and the scope of the claim is unclear.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 3, 4, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai (USPN 6,063,236) in view of Tan et al. (US 2003/0159656 A1), in further view of Mikata (USPN 6,211,081).

14. Regarding independent **Claims 7 and 8**, Sakai teaches a method for forming a CVD film (e.g., a silicon oxide film) on a substrate, the method comprising the steps of providing a CVD apparatus comprising a belljar process chamber, an electromagnetic coil for generating a helicon wave in the process chamber provided around the upper portion of the chamber, gas spouting holes (i.e., "nozzles") for supplying a plasma gas provided underneath the electromagnetic coil and around an

upper portion of the process chamber, gas spouting holes (i.e., "nozzles") for supplying a process gas provided at intervals of about 25 mm (i.e., equidistantly) around the circumference of the process chamber underneath the nozzles for supplying a plasma gas, heating means for heating the substrate, a chamber evacuation system comprising pumps and valves for controlling and reducing the pressure in the process chamber, and a gate valve for opening the process chamber and allowing handling of the substrate; and conducting CVD of the film on the substrate in the process chamber (Abstract, Figures 1, 2, and 4, Col.1, lines 14 – 24, Col.5, line 1 – Col.6, lines 29, Col.7, lines 3 – 51, Col.10, line 57 – Col.11, line 19). While Sakai generally teaches a chamber evacuation system comprising pumps and valves (see reference numbers "11" and "111" – "114"), Sakai does not explicitly teach that the system comprises a pressure control gate valve for controlling the pressure in the chamber and a turbo molecular pump for reducing pressure in the process chamber. However, Tan et al. teaches that using a combination of a pressure control gate valve and a turbo molecular pump in the chamber evacuation system of a high density plasma CVD process and system analogous to that of Sakai provides accurate and stable control of the chamber pressure (Abstract and paragraph [0029]). Therefore, it would have been obvious to one of ordinary skill in the art to provide the CVD apparatus of Sakai with a pressure control gate valve and a turbo molecular pump in order to reap the benefits taught by Tan et al. (i.e., accurate and stable control of the chamber pressure). Additionally, should the applicant argue that the gas spouting holes taught by Sakai are not "nozzles", please

note that Tan et al. teaches that a ring of gas supply nozzles can be used to deliver process gases in a high density plasma CVD process / system, and the nozzle length and angle may be changed to allow tailoring of the uniformity profile and gas utilization efficiency for a particular process within an individual chamber (paragraphs [0034] and [0035]). Therefore, it would have been obvious to one of ordinary skill in the art to utilize rings of nozzles (as opposed to "gas spouting holes") in the process of Sakai with the reasonable expectation of (1) success, as Tan et al. teaches that such nozzles are used to deliver process gases in a high density plasma CVD process / system, and (2) obtaining the benefits of using nozzles, such as the ability to tailor the uniformity profile and gas utilization efficiency for a particular process within an individual chamber. The combination of Sakai and Tan et al. does not explicitly teach that the introduction of the process gas (or the oxidizing or nitriding step) and the evacuation of the process chamber are not performed simultaneously. However, because Mikata discloses that providing process gas to the chamber and enclosing it therein without exhausting during the CVD process has the advantages of improved film uniformity and improved utilization of the process gas (Col.9, line 43 – Col.10, line 12), it would have been obvious to one of ordinary skill in the art to have so provided the process gas of Sakai to achieve these advantages. Regarding **Claim 3**, the process chamber is under an oxygen plasma condition when the process gas is introduced therein (Col.7, lines 20 – 36 of Sakai). Regarding **Claim 4**, a gas plasma is applied continuously to the substrate in the process chamber after the introduction of the

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process gas to efficiently deposit the film (Col.2, lines 1 – 3, Col.6, lines 19 – 23, Col.7, lines 30 – 43 of Sakai).

15. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai (USPN 6,063,236) in view of Tan et al. (US 2003/0159656 A1), in further view of Mikata (USPN 6,211,081), and in further view of Doi (USPN 5,690,050).
16. As an alternative (or in addition to) the reasoning above, the combination of Sakai, Tan et al., and Mikata teaches all the limitations of **Claims 3 and 4**, except for a method wherein the chamber is under an oxygen or nitrogen plasma condition when introducing the process gas, or improving the film characteristics by applying a gas plasma on the substrate in the chamber after the introduction of the process gas. However, the process of Sakai appears to be open to plasma processing in general (Abstract, Col.1, lines 13 – 24), and Doi teaches that a conventional process carried out in a helicon wave plasma reactor comprises plasma nitriding or plasma oxidizing a substrate (Col.9, lines 27 – 40). It would have been obvious to one of ordinary skill in the art to plasma oxidize or plasma nitride (improve the film characteristics of) a deposited or depositing film using the process / apparatus of the combination of Sakai, Tan et al., and Mikata in order to reap the benefits of doing so (i.e., improved uniformity and process gas utilization).

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17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai (USPN 6,063,236) in view of Tan et al. (US 2003/0159656 A1), in further view of Mikata (USPN 6,211,081), and in further view of Miyamoto (USPN 6,040,021).
18. The combination of Sakai, Tan et al., and Mikata teaches all the limitations of **Claim 5** as set forth above in paragraph 14, except for a method wherein, after introduction of the process gas, the steps are repeated to obtain a uniform predetermined thickness film. However, the process of Sakai appears to be open to plasma processing in general (Abstract, Col.1, lines 13 – 24), and Miyamoto teaches that repeating the steps of a helicon plasma CVD process a plurality of times produces a film having a desired thickness, the film being symmetrical, homologous, smooth, and uniform (Abstract, Col.1, lines 5 – 16, Col.4, lines 5 – 51, and Col.5, lines 36 – 40). It would have been obvious to one of ordinary skill in the art to perform the helicon plasma CVD process of Miyamoto using the process / apparatus of the combination of Sakai, Tan et al., and Mikata in order to reap the benefits of doing so (i.e., improved uniformity and process gas utilization).

Response to Arguments

19. Applicant's arguments filed on 4/18/2005 have been fully considered but they are not persuasive. Specifically, the applicant's arguments are moot in view of the new grounds of rejection set forth above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kadomura (USPN 6,096,160), Tamura (USPN 6,283,130), and Yin et al. (USPN 6,189,484) are cited to show various helicon wave plasma processing apparatuses and methods. Suzuki et al. (USPN 6,610,350) teaches treating an ophthalmic lens with a plasma in a chamber without evacuating the chamber (Col.2, lines 30 – 45).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571)

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272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

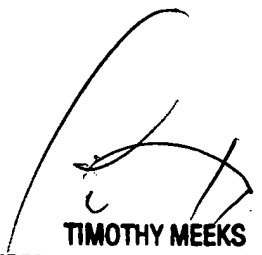
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
Art Unit 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER